

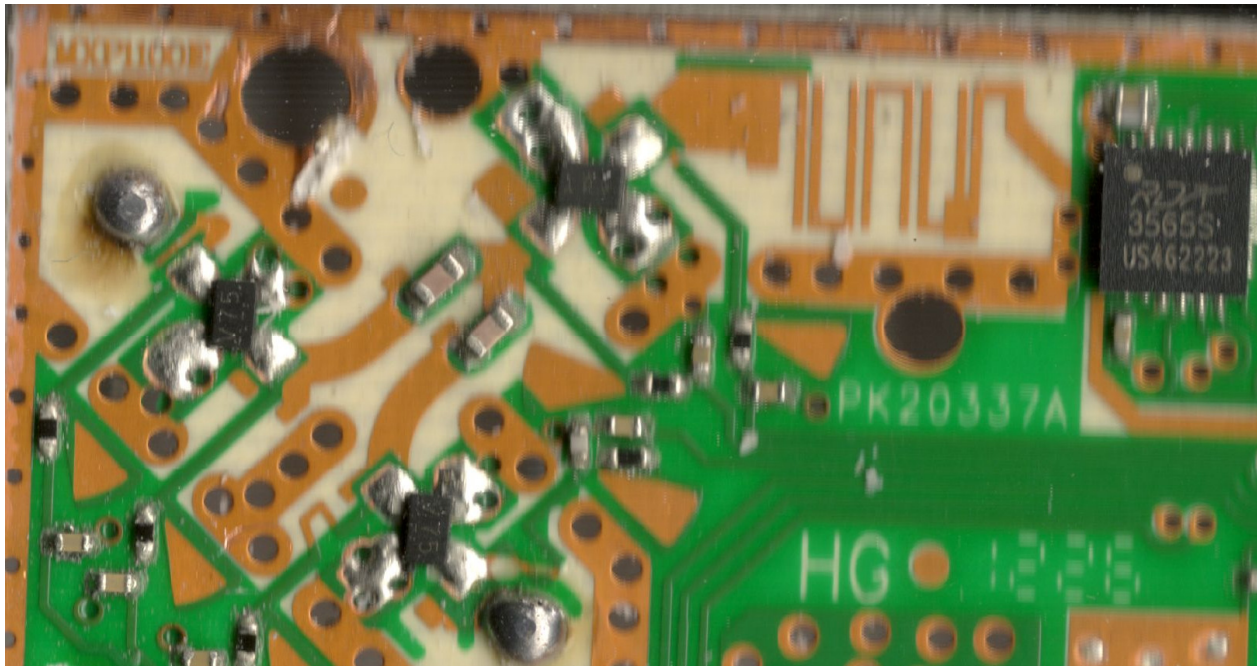
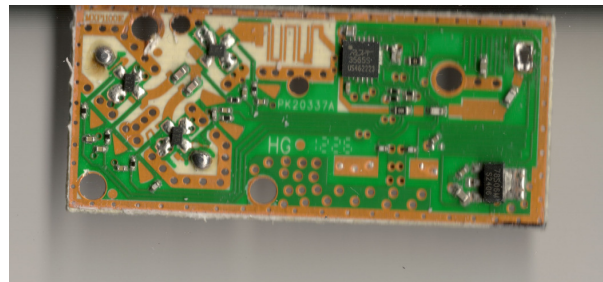
# 10 GHz Narrow Band using a \$6.00 TVRO LNB And a cheap \$20 USB DSP dongle as the IF Don W1FKF

[Donw1fkf-news@yahoo.com](mailto:Donw1fkf-news@yahoo.com)

I was browsing around on Amazon.com and came across TVRO LNB's (LNBF) and noticed that they had many different types from single output, dual output and quad output ones. What really caught my eye was the price, ranged from less than \$6.00 for single output to less than \$20 for a quad output one. So I ordered the \$5.95 Premium Universal Single LNB, it even had free shipping and came the next day.

I did not even try it, took it apart!

The two input probes are on the left, going to a NE3503M04 (0.45 dB noise figure device). Next a common FET, bandpass filter. Then a Low Current CMOS Integrated Satellite LNB Tuner (RDA3565S).



Here are the specifications for the chip: (RDA3565S)

## Features

1. CMOS Integrated Ku band to L band downconverter
2. Integrated VCO and PLL
3. Integrated pre-amplifier, mixer and L band buffer amplifier
4. Integrated reference oscillator ( 27MHz is default )

5. Integrated 22K tone detection and polar voltage selection
6. Integrated negative voltage generator and phemt FET bias control
7. Low phase noise
8. Low power consumption
9. Switched LO frequency between 9.75GHz and 10.6GHz
10. Also support 10.75GHz LO frequency
11. Also support 11.3GHz LO frequency
12. 5.5V to 6.5V operation
13. Low spurious

On the other side of the board is a 27 MHz crystal.

I had my fun investigating how it worked so I decided on getting a 2 output LNB

I found the specification sheet on the LNB:

**SR-3602 MINI twin output ku band hd LNB**

**FEATURES:**

Digital ready  
 Low noise figure  
 Easy installation  
 Low power consumption  
 Environmental protection  
 High quality weather protection

**SPECIFICATIONS:**

- 1) Input Frequency: 10.70~11.7GHz(LOW BAND);10.70~12.75GHz(HIGH BAND)
- 2) Output Frequency: 950~1950MHz(LOW BAND);1100~2150MHz(HIGH BAND)
- 3) LO Frequency: 9.75/10.6GHz;9.75/10.75GHz
- 4) Noise Figure: 0.1dB(Typ.)
- 5) Conversion Gain: 60dB(Typ.)
- 6) F/D Ratio: 0.6
- 7) Input Interface: Wave guide WR-75
- 8) Cross Pol. Isolation: 20dB(Typ.)
- 9) Image Rejection: 45dB(Min.)
- 10) Polarity Switching Voltage: Vertical: 12-14.5V ;Horizontal:16-18V
- 11) Operating Voltage: Vertical:11.5 ~ 14 Vdc ;Horizontal:16 ~19 Vdc
- 12) Band Switching Pulse: 0/22kHz tone
- 13) Gain Flatness:  $\pm 0.5$ dB/27MHz
- 14) D.C.Current Consumption: 160mA(Max.)
- 15) LO phase noise: -70dB/Hz at 10kHz;-90dB/Hz at 100kHz;-110dB/Hz at 1MHz
- 16) Output power(at 1dB gain compression): 10dB(Min.)
- 17) Output VSWR: 2.5:1(Max.)
- 18) Output connector: 75 $\Omega$  F type female



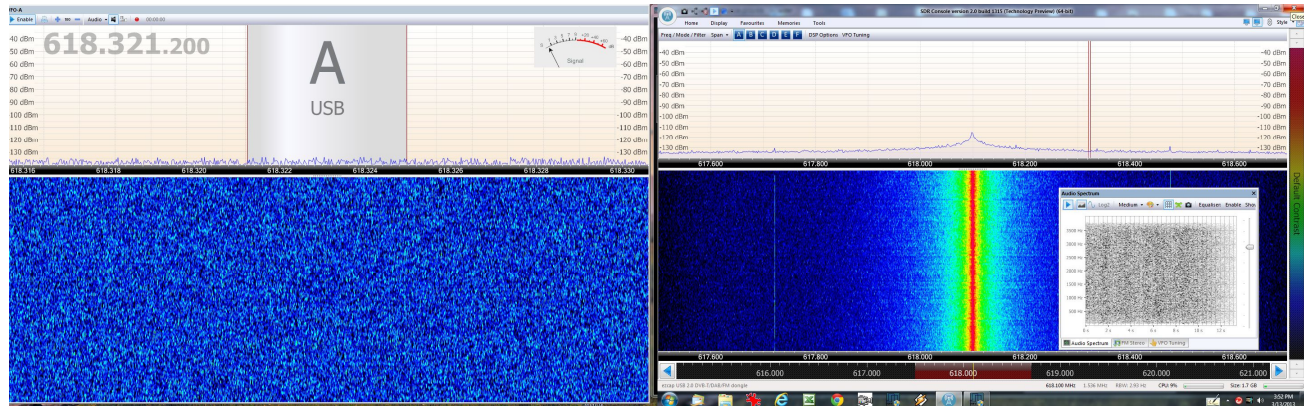


I needed some way to convert the signal coming from the LNB. The LO frequency is 9.750 GHz. So subtracting from 10.368.00 GHz we should need an IF of 618 MHz. This would be a perfect use of one of the cheapo \$20 dongles. A while back I got a Nooelec Brand RTL-SDR, FM+DAB, DVB-T USB Stick Set with RTL2832U & R820T from Amazon.

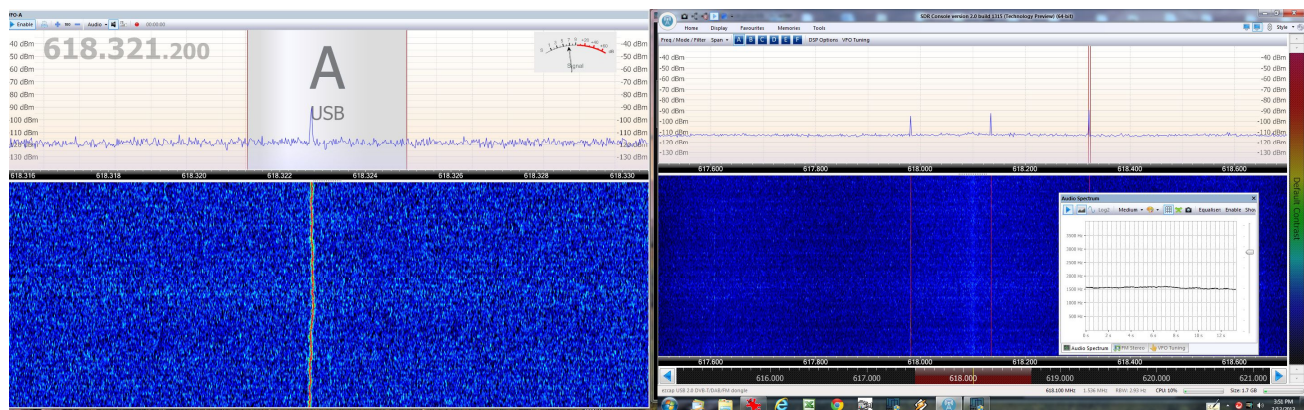
The frequency range is from 24 MHz to 1700 MHz  
It is an 8 bit device so the dynamic range is less than 60 dB. Good enough for weak signal, besides it has built in AGC.

The software I like to use is SDR Console V2, it is a bit tricky to get running but has a lot of features.

<http://v2.sdr-radio.com/>



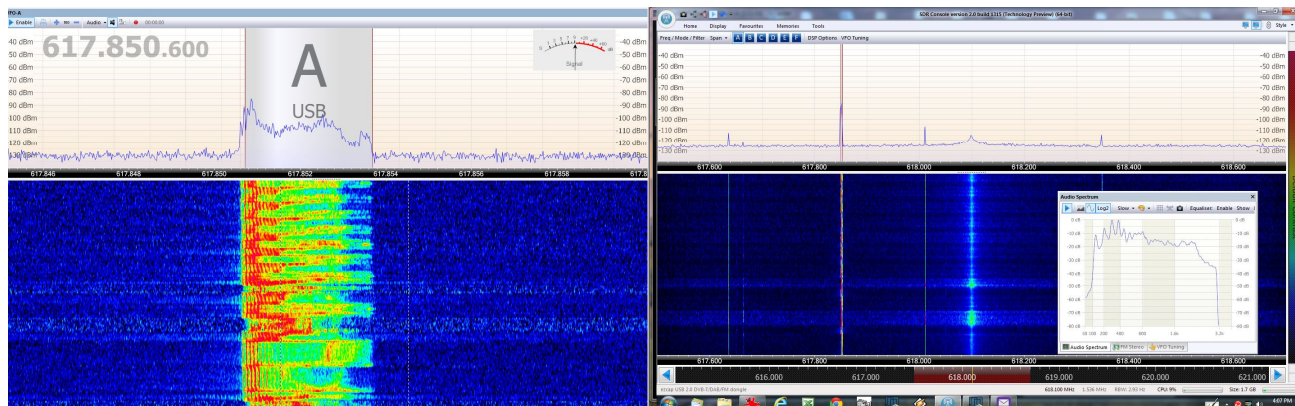
At 618 MHz the display looked birdie free except for the DC spike.



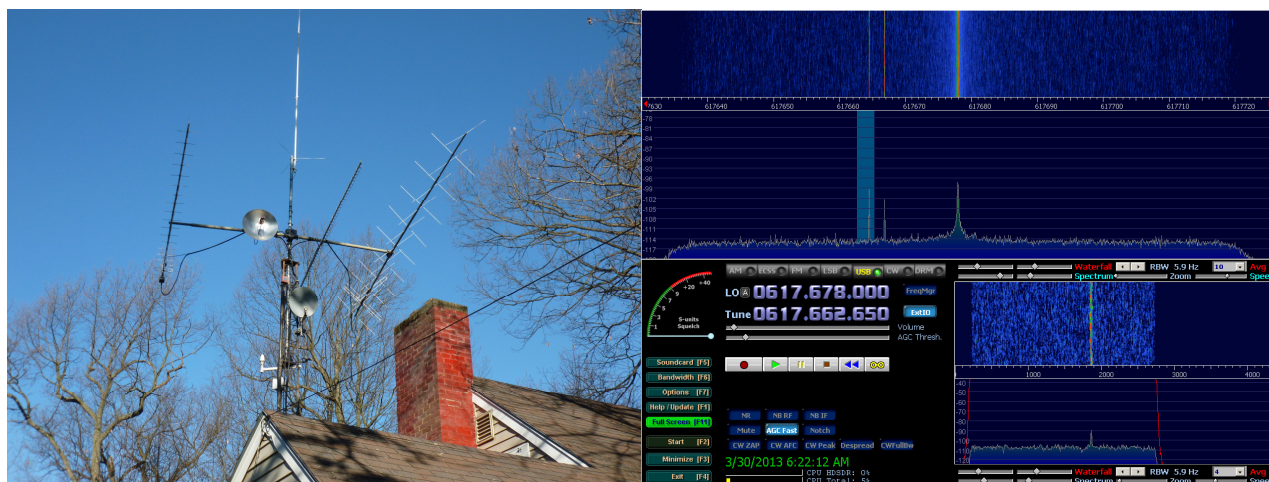
Signal generator set to 10.368100 GHz, a couple birdies from the LNB.

Note the base line shift; this is due to the gain of the LNB.

Absolute frequency varies from LNB to LNB



SSB test signal



Mike N1JEZ is using one of the LNB's and a 18 inch dish, it is on his tower to monitor the beacon on Mt Mansfield. Mike Lives in Burlington Vt. He uses a Fun Cube dongle and HDSDR software.

## Conclusion:

If you want to find out if you are able to here 10 GHz signals at your QTH here is a cheap way to do it. A TVRO dish can be had at Flea market for cheap money, LNB for \$6-\$15 and the Dongle for \$20 or less. I have ordered some 27.5 MHz crystal to change the reference. This should bring the IF to 437.----- Then repackage the converter and add a crystal heater for stability.